UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
525 NE Oregon Street
PORTLAND, OREGON 97232-2737

Refer to:
OSB1999-0115

March 3, 1999

Jim Furnish
Siuslaw National Forest
P.O. Box 1148
Corvallis, Oregon 97339

Van Manning
Bureau of Land Management
Salem District Office
1717 Fabry Road SE
Salem, Oregon 97306

Cary Osterhaus
Bureau of Land Management
Roseburg District Office
777 NW Garden Valley Boulevard
Roseburg, Oregon 97470

RE: Section 7 Consultation for Proposed Actions in the U.S. Forest Service -Siuslaw National Forest, Bureau of Land Management (BLM) -Salem District, and BLM - Roseburg District, that May Affect Oregon Coast Coho Salmon within the Oregon Coast Range Province

Dear Messrs. Furnish, Manning, and Osterhaus:

The National Marine Fisheries Service (NMFS) has received the following letters and biological assessments (BAs), requesting consultation on actions that may affect Oregon Coast coho salmon within the Oregon Coast Range Province: a September 3, 1998, letter and BAs, from Van Manning [Bureau of Land Management (BLM)] and James R. Furnish [U.S. Forest Service (USFS)] to Elizabeth Holmes Gaar (NMFS); a November 23, 1998, letter and BA, from Cary Osterhaus BLM) to Elizabeth Gaar (NMFS); a December 14, 1998, letter and BA, from James R. Furnish (USFS) to Elizabeth Holmes Gaar (NMFS); and a revised BA, received on December 29, 1998, from the USFS. Table 1 provides a summary of administrative unit, project title, and disposition of each project submitted for consultation with the above correspondences. The BAs describe the environmental baseline and effects of the actions summarized in Table 1.

Table 1. Summary and disposition of actions submitted for consultation

Administrative Unit	Project Title	Date Submitted	Date NMFS Received	Effects Determination	Disposition
Siuslaw National Forest (NF)	Baxter Thin	9/3/98	9/4/98	LAA	Addressed in this document
Siuslaw NF	Robinson LE	9/3/98	9/4/98	LAA	Addressed in this document
Siuslaw NF	Eichler Thin Project	12/14/98	12/16/98, 12/29/98	LAA	Addressed in this document
Salem BLM	Bummer Swamp Regenertation Harvest	9/3/98	9/4/98	LAA	Addressed in this document
Salem BLM	Upper Nestucca Motorcycle Trail	9/3/98	9/4/98	LAA	To be addressed in separate document
Salem BLM	Twilight TS	9/3/98	9/4/98	LAA	Concurrence letter issued on 9/21/98
Roseburg BLM	Ward Creek Thin	11/23/98	11/25/9	NLAA	Addressed in this document

The purpose of this letter is to document the NMFS' biological opinion (Opinion) that the Baxter Thin Timber Sale (TS), Robinson Land Exchange (LE), Eichler Thin Project, Bummer Swamp Regeneration Harvest, and Ward Creek Density Management and Commercial Thinning Harvest (Ward Creek Thin) are not likely to jeopardize the continued existence of Oregon Coast coho salmon, as explained below[1]. This consultation is conducted under section 7(a)(2) of the Endangered Species Act (ESA), and its implementing regulations, 50 CFR 402.

[1] The Upper Nestucca Motorcycle Trail Project is not included in this consultation because the proposed action includes a Monitoring and Evaluation Plan and a Maintenance Plan, which are currently in development. Since the Plans are not completed, but are part of the proposed action, the NMFS cannot effectively analyze the effects of the action. A separate Opinion will be issued upon completion of the Plans.

Oregon Coast coho salmon (*Oncorhynchus kisutch)* was listed as threatened under the ESA by the NMFS on August 10, 1998 (63 FR 42587). The effective date of the listing was October 9, 1998.

Siuslaw NF, Salem District BLM, and Roseburg District BLM, personnel made the effects determination in the Bas following procedures described in NMFS (1996, 1997a). The effects of the individual actions proposed in the Bas were evaluated by the USFS and BLM biologist at the project scale using criteria based upon the biological requirements of Oregon Coast coho salmon and the Aquatic Conservation Strategy (ACS) objective of the Northwest Forest Plan (NFP, USDA-FS and USDI-BLM 1994). The USFS and BLM biologists also evaluated the likely effects of the proposed actions on the watershed scale and in the long-term in the context of watershed processes. The level-1 streamlined consultation team for the Siuslaw NF, Salem purposes as about a decade, while short term effects would occur for a lesser period, most typically about a year. The level-1 team for the Siuslaw NF, Salem District BLM, and Roseburg District BLM met on August 27, 1998, to review the effects determinations and documentation of ACS consistency for the proposed actions. The team concurred on the effects determinations and ACS consistency analyses.

Proposed Actions

The proposed actions occur within the Wilson/Trask/Nestucca river basin, Siuslaw River basin, and Alsea River basin fourth field hydrologic unit codes[2] (HUC) in the Oregon Coast Range Province. Within the Wilson/Trask/Nestucca river basin, Baxter Thin TS is proposed in the Three Rivers fifth field HUC (watershed) and Little Nestucca watershed; within the Siuslaw River basin, Robinson LE is proposed in the Deadwood Creek watershed, Eichler Thin Project is proposed in the North Fork Siuslaw River watershed, and Ward Creek Thin is proposed in the South Fork Siuslaw River watershed; and within the Alsea River basin, Bummer Swamp Regeneration Harvest is proposed in the Upper Alsea River watershed. Table 2 provides a summary of each proposed action and its location. The Bas have detailed information on each of the proposed actions, but brief summaries are provided below.

---

[2] Stream drainages can be arranged in nested hierarchies, in which a large drainage is composed of smaller drainages. The USFS and BLM use a system in which these drainages numbered in a computer database for analytical purposes. The number identifier of a particular drainage in this database is called its hydrologic unit code, or HUC. This HUC increases with decreasing drainage area, thus a fourth field HUC (such as Siuslaw River basin) is composed of several fifth field HUCs (such as Wolf Creek, Lake Creek, etc., hereafter referred to as a watershed)_, and so on. The Northwest Forest Plan determined that the scaled for Watershed Analyses should be 20 to 200 square miles, which often corresponds to a fifth field HUC.

Table 2. Proposed actions addressed in this document, its location within the Oregon Coast Range Province, and relevant watershed analysis.

Administrative Unit	Action	4th field (Basin)	5th field (Watershed)	Watershed Analysis
Siuslaw NF	Baxter Thin	Wilson/Trask/ Nestucca River	ThreeRivers, Little Nestucca	Little Nestucca, Nestucca
Siuslaw NF	Robinson LE	Siuslaw River	Deadwood Creek	Indian/Deadwood
Siuslaw NF	Eichler Thin	Siuslaw River	NorthFork Siuslaw	North Fork Siuslaw
Salem District BLM	Bummer Swamp Regeneration Harvest	Alsea River	Upper Alsea	South Fork Alsea
RoseburgDistrict BLM	Ward CreekThin	Siuslaw River	Upper Siuslaw	Siuslaw

In the Baxter Thin TS, the USFS proposes to commercially thin 220 acres of 70-85 year-old Douglas fir plantations to 70-90 trees per acre and precommercially thin 146 acres to 100-200 trees per acre within Late Successional Reserve (LSR) and Riparian Reserve land use allocations in non-key watersheds. The purpose of thinning within LSR is to help the stand move quicker toward late successional conditions by accelerating tree growth and improving stand diversity. Thinning in the Riparian Reserves has similar goals of improving stand diversity and accelerating tree growth. About 32 acres of the commercial thinning would occur within Riparian Reserves, where 100- to 250-foot no-cut buffers would be maintained. One-ended suspension of all material is required in cable logged areas, however, full suspension will occur where possible. Ground based equipment will not be used on slopes greater than 30%. Two thousand feet of semi-permanent road will be constructed on gentle slopes with no stream crossings. All newly constructed roads will be decommissioned at the end of the project.

In the Robinson LE, the USFS proposes to dispose of 8,0 acres of Federal land and acquire 6.9 acres of private land. The 8.0 acres of land to be disposed consist of approximately 1.0 acres of alder/conifer mix, 4.0 acres of heavily impacted riparian meadow of an existing homestead, and 3.0 acres of managed riparian meadows with little development. The 6.9 acres of land to be acquired consist of 0.8 acres of floodplains and mainstem West Fork Deadwood Creek and 6.1 acres of upland alder/conifer.

In the Eichler Thin Project, the USFS proposes a commercial thin and various restoration activities within a key watershed. The commercial thin would occur on 163 acres of LSR, Matrix, and Riparian Reserve land use allocations. The purpose of thinning within LSR (20 acres) is to help the stand move quicker toward LSR conditions by accelerating tree growth and improving stand diversity. Thinning in Riparian Reserves (130 acres) have similar goals of improving stand diversity and accelerating tree growth, but is mainly focused on improving conditions for riparian dependent plant and animal species. Thinning within Matrix (13 acres) is limited to areas on or near ridge tops with the goals of increasing the value of the timber resources and providing habitat for non-LSR dependent species. Eichler Thin would occur in managed conifer stands between 27 and 55 years old. In addition, two acres of alder stand

adjacent to a managed conifer stand will be converted to a mixed conifer stand. Stands will be thinned to 60-90 trees per acre. Dominant trees will be retained. No-cut buffers will vary depending on slope stability, aspect, tree densities, and topography, but will have minimum widths of 2-3 tree crown widths (30-45 feet). Yarding and hauling of harvested timber would be accomplished with both cable and ground based equipment. Approximately 15,800 feet of old road will be reopened and an additional 700 feet of new temporary road will be constructed. All of the new road construction will be within Riparian Reserves. However, it will either be on ridge tops with no stream crossings, or on the opposite side of a county road. This road does not have any stream crossings and drainage off the road will not enter any tributaries to the North Fork Siuslaw River. All USFS roads used for the timber sale (approximately 14,000-14,500 feet) will be closed and waterbarred after use. Approximately 2000-2500 feet of the road is located on private land and will remain open upon completion of the proposed action. Restoration activities proposed under the Eichler Thin Project include riparian plantings of conifer, snag creation, instream structure placements, sidecast pullbacks, waterbarring roads, and unplugging culverts.

In the Bummer Swamp Regeneration Harvest, the BLM proposes to regeneration harvest approximate 54 acres of Matrix lands and convert 46 acres (45 acres of upland and 1 acre of Riparian Reserves) from a hardwood dominated stand to conifers in the headwaters of Bummer Creek and Swamp Creek subwatersheds (within a non-key watershed). The South Fork Alsea Watershed Analysis (W A; USDI-BLM 1995) generally recommended promoting growth of older conifers in riparian areas and density management projects to promote large tree development and desirable vegetative structure. In addition, riparian stands dominated by hardwoods were identified as a high priority for treatment in this watershed. These long-term goals may be achieved by utilizing silvicultural practices within riparian reserves designed to provide specific older forest characteristics, such as large diameter trees, species diversity ,- structural diversity , multiple canopy layers, large snags, and down woody debris. Eighty-four acres, including the acre within Riparian Reserves, will be skyline cable yarded, and 16 acres will be yarded using ground based equipment. All landings will be located outside Riparian Reserves. Approximately 0.2 miles of road would be improved with clearing and surfacing, and approximately 1 mile of permanent road will be constructed, half on ridge top locations, and the other half traversing stable slopes ranging from 0-60%, with no stream crossings. All roads will be blocked or gated after use.

In the Ward Creek Thin, the BLM proposes to commercially thin 38 acres from below within Matrix (26 acres) and Riparian Reserve (12 acres) land use allocations in a non-key watershed. The purpose of thinning in the Riparian Reserves is to accelerate tree growth and encourage the accelerated recruitment of large woody debris (USDI -BLM 1996; page V -1). Twenty- to 50-foot no-cut buffers would be retained. Yarding and hauling of harvested timber would be accomplished by skyline cable on 21 acres and tractor on 17 acres. Full suspension would be used if logs need to be yarded across streams. Approximately 535 feet of new temporary road construction is needed for 2 spurs. In addition, approximately 1.7 miles of road will be surfaced and drainages upgraded.

Biological Information and Critical Habitat

The biological requirements (including the elements of critical habitat) of Oregon Coast coho salmon are discussed in NMFS (1997a). Environmental baseline conditions in the Oregon Coast Range Province are discussed in Weitkamp *etal.* (1995), and pages 12-15 and 17 of NMFS (1997a), and pages 10-12 in Attachment I of NMFS (1997a). Cumulative effects as defined under 50 CFR 402.02 are discussed for Oregon Coast coho salmon on pages 40-43 of NMFS (1997a). These respective analyses are incorporated herein by this reference. The NMFS is not aware of any newly available information that would materially change these previous analyses of biological requirements, environmental baseline or cumulative effects for the purpose of this Opinion. Some general biological information is provided below.

Oregon Coast coho salmon are an anadromous species which typically have a three-year life-cycle and occur in all three subject fourth field HUCs. Adults spawn in the late fall and winter, with fry emergence occurring the following spring. Juvenile coho salmon rear for about a year in natal streams and then out migrate to the ocean as smolts in the spring. Some male coho salmon return to freshwater to spawn the fall and winter of the same year as their smolt migration, but the majority of adult Oregon Coast coho salmon do not return to spawn until having spent about 18 months in the ocean. Thus, an active Oregon Coast coho salmon stream would be used for some life history stages as rearing, feeding, spawning, and incubation habitat year-round.

The Little Nestucca watershed contains approximately 71 miles of fish-bearing streams, of which 39 miles support anadromous fish (USDA-FS 1998). The Nestucca River Watershed (which includes the Three Rivers watershed) contains 202.8 miles of habitat utilized by Oregon Coast coho salmon, and 574.5 miles of resident cutthroat trout habitat (USDA-FS *et at.* 1994). The Indian/Deadwood W A (USDA-FS 1996) lists over 360 miles of perennial fish bearing streams, of which 150 miles are anadromous fish habitat. The North Fork Siuslaw watershed contains about 114 miles of anadromous fish habitat, of which 81 miles of streams are utilized by Oregon Coast coho salmon (USDA-FS 1994). The Siuslaw River watershed has approximately 265 miles of potentially fish-bearing streams. Of these streams, approximately 123 miles are accessible to coho salmon (USDI-BLM 1996). Resident cutthroat trout populations utilize approximately 170 miles of streams and anadromous fish are found in approximately 100 miles of streams within the South Fork Alsea watershed (USDI-BLM 1995).

Although general information about the populations of Oregon Coast coho salmon within the Three Rivers, Little Nestucca River, Deadwood Creek, North Fork Siuslaw River, South Fork Siuslaw River, and Upper Alsea River watersheds is available (e.g., those streams likely inhabited), specific information on the size and health of anadromous fish populations on a stream or watershed scale in the Oregon Coast Range Province is often lacking or incomplete. Because of the general paucity of the type of knowledge, and the fact that all fish species, populations, and individuals depend on adequate habitat, the NMFS uses a habitat-based system in ESA consultation on land-management activities (Attachment 1 of NMFS 1997a). The NMFS has applied the concept of Properly Functioning Condition (PFC) to assess the quality of the habitat that fish need to survive and recover. This concept is discussed in the next section. Site-specific environmental baseline descriptions and effects determination were made by OSFS and BLM personnel for each of the proposed actions. This information is found in the EAs,

W As, and the project-level (sixth-field HOC) checklists for documenting environmental baseline and effects of proposed actions on relevant indicators for the Oregon Coast Range Province (Checklist) which were included in the BAs. In addition, watershed-level information on Oregon Coast coho salmon habitat is provided in the EAs, W As, and fifth-field Checklists and text. The NMFS concurred with these site-specific and watershed environmental baseline descriptions and effects determinations in the streamlined consultation process, and the NMFS considered them in addition to the broad scale analysis done for NMFS (1997a) described above.

Evaluation of Prouosed Actions

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by the implementing regulations (50 CFR 402). Attachment 2 of NMFS (1997a) describes how the NMFS applies the ESA jeopardy and destruction/adverse modification of critical habitat standards to consultations on Federal land management actions in the Oregon Coast Range Province.

As described in Attachment 2 of NMFS (1997a), the first steps in applying the ESA jeopardy standards are to define the biological requirements of Oregon Coast coho salmon and to describe the species' current states as reflected by the environmental baseline. In the next steps, the NMFS' jeopardy analysis considers how proposed actions are expected to directly and indirectly affect specific environmental factors that define properly functioning aquatic habitat essential for the survival and recovery of the species. This analysis is set within the dual context of the species' biological requirements and the existing conditions under the environmental baseline [defined in Attachment 1 of NMFS (1997a)]. The analysis takes into consideration an overall picture of the beneficial and detrimental activities taking place within the action area, which is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). If the net effect of the activities is found to jeopardize the listed species, then the NMFS must identify any reasonable and prudent alternatives to the proposed action.

Biological Requirements. For this consultation, the NMFS finds that the biological requirements of Oregon Coast coho salmon are best expressed in terms of current population status and environmental factors that define properly functioning freshwater aquatic habitat necessary for survival and recovery of the species. The NMFS defines this PFC as the state in which all of the individual habitat factors operate together to provide a healthy aquatic ecosystem that meets the biological requirements of the fish species of interest Individual measurable habitat factors (or indicators) have been identified (e.g., water temperature, substrate, etc.), and the "properly functioning" values for these indicators have been determined, using the best information available. These indicators, when considered together, provide a summary of the conditions necessary to ensure the long-term survival of aquatic species.

The NMFS has assembled a set of these indicators in a table called the Matrix of Pathways and Indicators (NMFS 1996). The Matrix lists several categories or "pathways" of essential salmonid habitat, such as water quality, instream habitat elements, and flow/hydrology. Under these pathways are quantitative habitat indicators for which ranges of values are identified that correspond to a "properly functioning" condition, an "at risk" condition, and a "not properly

functioning" condition. Because these habitat measurements are more readily available than quantitative measurements of biological variables (such as incubation success, standing crop, and growth rate), the USFS, BLM, and NMFS are able to assess the health of stream reaches or watersheds based on the condition of their component indicators. Such an assessment provides a baseline description of the health of the stream/watershed, and also allows the effects of an action (e.g., timber harvest) to be evaluated.

Properly functioning watersheds, where all of the individual factors operate together to provide healthy aquatic ecosystems, are necessary for the survival and recovery of the listed species. It follows, then that the NMFS has determined that an action which would cause the habitat indicators of a watershed to move to a degraded condition or one which further degrades a "not properly functioning" watershed is also likely to jeopardize the continued existence of the listed species.

In addition to the use of the Matrix at the watershed level to assist in making "jeopardy:" determinations in Section 7 consultations (especially for land management agencies), the NMFS also uses the Matrix at the site or project scale (often the sixth or seventh field HUC). Assuming that a Federal agency determines that an action "may affect" a listed species, either informal or formal consultation is required. To assist in this determination, the action agency prepares a project-level Checklist. If no "degrades" occur at this smaller scale, then the action is probably "not likely to adversely affect" (NLAA) individuals of a listed species, and an informal Section 7 consultation is appropriate. If the proposed action degrades any of the indicators at this scale, then the action is generally considered to be "likely to adversely affect" (LAA), and formal consultation must occur.

Current range-wide status of listed species under environmental baseline. The NMFS described the current population status of Oregon Coast coho salmon in a status review (Weitkamp *et al.* 1995) and in the final rule (August 10,1998,63 FR 42587). The recent range-wide status of Oregon Coast coho salmon is summarized in Attachment 1 of NMFS (1997a).

Current status of listed sgecies under environmental baseline within the a As noted above, the "action area" includes all areas directly or indirectly affected by the proposed actions. The general action areas for this Opinion can be defined as the Three Rivers, Little Nestucca, Deadwood Creek, North Fork Siuslaw River, South Fork Siuslaw River and Upper Alsea River watersheds. As noted above, Oregon Coast coho salmon use the action areas as rearing, feeding, spawning, and incubation habitat, as well as a migration corridor. The environmental baseline of the action areas are dominated by conditions rated largely as "at risk" or "not properly functioning" (see watershed Checklists and text in the BAs). These conditions are likely primarily the result of past forest management and agricultural practices, in particular, timber harvest/clearing within riparian zones, large-scale clear-cut timber harvest, road construction (especially within riparian zones), and timber yarding in riparian zones and streams. Although the NMFS reviewed the indicators that would "maintain" or "restore" habitat as a result of each proposed action, indicators particularly at issue in this consultation are those which the

proposed actions would likely degrade at the project scale. In this case, "turbidity ," "substrate/sediment," "large woody debris," "road density and location," "disturbance history," and "riparian reserves" were determined to be degraded at the project scale by at least one of the proposed actions. These indicators were listed as "at risk" or "not properly functioning" for all of the watersheds.

Based on the best information available on the current status of Oregon Coast coho salmon [Attachment 1 of NMFS (1997a)], the NMFS assumptions given the information available regarding population status, population trends, and genetics [Attachment 2 of NMFS (1997a)], and the relatively poor environmental baseline conditions within the action areas (see Checklists in the BAs and August 10, 1998, 63 FR 42587), the NMFS finds that the environmental baseline does not currently meet all of the biological requirements for the survival and recovery of the listed species within the action areas. Actions that do not retard attainment of properly functioning aquatic conditions, when added to the environmental baseline, are necessary to meet the needs of the species for survival and recovery.

Analysis of Effects

The effects determinations in the BAs were made using a method for evaluating current aquatic conditions (the environmental baseline) and predicting effects of actions on them. This process is described in NMFS (1996). This assessment method (in which Checklists are assembled by action agency biologists) was designed for the purpose of providing adequate information in a tabular form for the NMFS to determine the effects of actions subject to consultation. Additionally, a detailed discussion of the potential effects of timber harvest and associated

activities on salmonid habitat is presented in NMFS (1997b), and is incorporated herein by this reference. Similarly, a general discussion of the potential effects of associated road construction on salmonids and their habitat is provided in NMFS (1997a).

The USFS and BLM use the Matrix and Checklist to make project-level effects determinations: whether an action is "NLAA " or "LAA " the listed species (in this case, Oregon Coast coho salmon). If any of the indicators is thought to be degraded at the project level by the action, the action is determined to LAA. In turn, if a project was determined to LAA a listed species, then, based on the "jeopardy" standard delineated in NMFS (1997a), the USFS and BLM need to determine whether the project, when combined with the environmental baseline for the watershed over the long-term, is consistent with the ACS of the NFP. This "consistency" is condensed to a two-part test in NMFS (1997a, page 14 of Attachment 2): Is the proposed action in compliance with the standards and guidelines (S&.G) for the relevant land use allocation, and does the proposed action meet all pertinent ACS objectives? This determination is made with the assistance of the Checklist at the watershed scale.

Project-Level Effects. The Checklists provided by the USFS and BLM for the effects of actions are expressed in terms of the expected effect (restore, maintain, or degrade) on aquatic habitat factors in the project areas/sixth field HUC affected by the proposed actions. The results of the completed Checklists for the proposed actions provide a basis for determining the effects of the actions on the environmental baseline in the project areas.

In this consultation, the USFS and BLM provided a Checklist for each sixth field HUC affected by each of the proposed actions. In general, the USFS and BLM determined the actions would not degrade a majority of the habitat indicators at the project level, chiefly because of the maintenance (through the use of full-width Riparian Reserve buffers) and/or enhancement (through thinning from below in young Riparian Reserve stands to enhance growth of remaining trees) of the riparian zones. Also, the USFS and BLM believe that timber harvest would be performed in ways which would have little or no effect on the hydrologic characteristics of the sites. Thinning results in relatively small effects on canopy closure, and ground based yarding is limited to gentle slopes. No new road construction will require stream crossings. Regeneration harvest will result in the loss of canopy closure, but maintenance of riparian reserves will minimize potential adverse effects. Degradation of habitat indicators as a result of implementation of the proposed actions are primarily short term, with long term maintenance or restoration of the indicators.

Baxter Thin: The USFS found that at the project level, the "turbidity" indicator would be degraded due to the proposed action, and all other indicators would be maintained or restored. The USFS attributes the "degrade" check mark for "turbidity" to a transitory increase in stream turbidity due to timber haul. Turbidity is not expected to be affected by the timber harvest or road construction. Slash left after harvest operations is expected to filter out and remove any nutrients before they reach stream channels. Road construction will be located on ridge tops. In Baxter Thin, as well as the other timber sales in this Opinion, Riparian Reserve buffers and/or location of new road construction on midslope or ridgetop with no stream crossings should prevent most (or all) of the ground-disturbing activities from transmitting substantial amounts of sediment into stream channels. In addition, to reduce sedimentation and road wear, "constant reduced tire pressure" will be used. Tree thinning should not have any direct effects on streams, because the no-cut buffer should be able to filter sediment, as well as maintain shade and bank stability. The long-term effect of woody debris should be positive, because the thinning would leave the largest trees and allow these trees to grow more quickly to eventually produce longer and more massive pieces of large woody debris. Because of the presence of the "degrade" checkmark at the project scale, the USFS determined that Baxter Thin is likely to adversely affect Oregon Coast coho salmon. The NMFS concurs with the USFS on this Project-level effects determination.

Robinson LE: The USFS found that at the project level, all of the habitat indicators wou14 be maintained of restored as a result of the proposed action. Lands to be disposed by the USFS include a riparian meadow that is currently being managed by the private landowners who are engaging in a riparian planting program to aid the stream. Although the USFS will no longer have management control over these lands, it expects the disposed land to be managed in the same manner. Riparian areas in the disposed lands are degraded, and the private landowners expect to continue the riparian planting program after acquiring the lands. Short reaches of two small tributaries are also involved in the land disposed. These tributary areas are limited to cutthroat trout use and are not significant producers of fish or fish habitat in this system. Eight -tenths of an acre to be acquired by the USFS are within the floodplains of mainstem West Fork Deadwood Creek, and would allow the USFS to actively engage in stream restoration in

this reach. The Indian/Deadwood W A (USDA-FS 1996) identified that riparian woody vegetation is lacking in many areas and planting of conifers in clumps as well as willow plantings will improve streambank stability and increase shade. Acquisition of the private inholding in the upper section should be pursued if opportunity presents itself. Although this proposed action will not result in the degradation of any habitat indicators, the USFS determined that the proposed action is LAA Oregon Coast coho salmon because management control will be lost in the short reaches of two small tributaries and some riparian meadow. The NMFS concurs with the USFS on this project-level effects determination.

Eichler Thin: The USFS found that at the project level, the "substrate/sediment" indicator would be degraded due to the proposed action, and all other indicators would be maintained or restored. The USFS attributes the "degrade" checkmark for "substrate/sediment" to a transitory increase in stream sedimentation, due to timber harvesting, road construction and maintenance, and restoration activities associated with the proposed action. Because of the presence of the "degrade" checkmarks at the project scale, the USFS determined that Eichler Thin is likely to adversely affect Oregon Coast coho salmon. The NMFS concurs with the USFS on this project-level effects determination. L

Bummer Swamp Regeneration Harvest: The BLM found that at the project level, the "road density and location" and "disturbance history" indicators would be degraded due to the proposed action, and all other indicators would be maintained. The BLM attributed a "degrade" to the "road density and location" indicator because the action would result in an increase of approximately 1 mile of new permanent road in the non-key watersheds. This new road construction is limited to ridge top locations and stable slopes. There are no stream crossings, and all road segments would be outsloped, or insloped with armored draindips. Following the timber sale activities, all new roads would be blocked to eliminate motorized vehicle use. The BLM also attributed a "degrade" to the "disturbance history" indicator because the action would result in the loss of canopy cover [except for the green tree retention S&Gs in USDA-FS and USDI-BLM (1994)]. Disturbance history cannot directly affect anadromous fish or other aquatic biota, but may affect other mechanisms, such as peak/base flows or streambank condition, which are also included among the indicators. Thus, the BLM believes that while the "disturbance history" indicator would be degraded due to a loss in canopy cover, the change in canopy cover would not, for example, affect peak flows during rain on snow events enough to widen stream channels enough to affect the amount of pool habitat for Oregon Coast coho salmon. Changes in the indicator would likely not directly affect riparian or aquatic habitat. Because of the presence of the "degrade" checkmarks at the project scale, the BLM determined that the Bummer Swamp Regeneration Harvest is likely to adversely affect Oregon Coast coho salmon. The NMFS concurs with the BLM on this project-level effects determination.

Ward Creek Thin: The BLM found that at the project level, the "sediment/turbidity," "substrate," "large woody debris," "disturbance history," and "riparian reserves" indicators would be degraded due to the proposed action, and all other indicators would be maintained or restored. The.BLM attributes the "degrade" checkmark for "sediment/turbidity" and "substrate" to a short term generation of sediment from road (including stream culvert replacements) and harvest related activities (hauling/increased truck traffic). Degradation of "substrate" is the localized, short-term increases to baseline fine sediment levels in streams adjacent to or downstream from

(within approximately 200 feet) the activity. Degradation of the "large woody debris" indicator is attributed to the removal of small diameter (generally less than 20 inches diameter breast height) trees within the Riparian Reserves adjacent to selected intermittent and ephemeral streams. Although woody debris of this size class has its benefits and functions within stream channels, it is not technically classified as large woody debris in the Matrix (large woody debris is considered 24 inches in diameter and 50-feet long). Degradation of "disturbance history" is attributed to lessened canopy cover, which has a low potential to affect hydrologic functions such as peak and base flows, and channel conditions. Thinning of the 182 acres in the project area (38 acres within the Siuslaw River Basin) would reduce the current canopy closure from approximately 90% to approximately 50% and result in a low level, short term increase in local disturbance levels. This would be expected to persist for approximately 10 years as residual tree canopies increase in size and return canopy closure to pre-treatment levels. As indicated above, disturbance history cannot directly affect anadromous fish or other aquatic biota, but may affect other mechanisms, such as peak/base flows or streambank condition, which are also included among the indicators. The BLM believes that degradation of the indicator would not cause any adverse effects on Oregon Coast coho salmon habitat, as changes in the indicator would likely not directly affect riparian or aquatic habitat. Finally, the "degrade" checkmark for "riparian reserves" is attributed to thinning 12 acres of overstocked trees within early successional forest stands. Short-term adverse affects are reduced small wood recruitment and altered micro-climate conditions within the localized areas. This may potentially lead to decreased small wood delivery to fish-bearing reaches. Changes in micro-climate conditions are not expected to influence streams. Because of the presence of the "degrade" checkrnarks at the project scale, the BLM determined that Ward Creek Thin is likely to adversely affect Oregon Coast coho salmon. The NMFS concurs with the BLM on this project-level effects determination.

Watershed-Level Effects. In the BAs, the USFS and BLM provided watershed-scale analyses for each of the indicators that would be degraded as a result of the proposed actions, along with ACS consistency reviews for each proposed action. The watershed-scale analyses evaluated the effects of the proposed action on habitat indicators in the fifth-field HUC relative to the long-term environmental baseline. That is, while many actions have short-term, small scale adverse effects, including those that may be beneficial in the long-term, only those actions which would adversely affect the environmental baseline over an entire watershed over a long period would receive a "degrade" checkmark. It is important to realize that both active and passive restoration activities contribute to the environmental baseline. In particular, the passive restoration that will occur over the long-term (at least a decade, see above), especially in Riparian Reserves," is a principal component of the watershed recovery aspect of the NFP. The role of Riparian Reserves, LSRs, etc., in restoration of watersheds is described in USDA-FS and USDI-BLM (1994) and NMFS (1997a).

The ACS consistency reviews included a description of how the proposed actions comply with the nine ACS objectives. Because there is strong correspondence between the habitat indicators of the Matrix and the ACS objectives, it is likely that if habitat indicators in the watershed level Checklist is maintained or restored by an action, then compliance with ACS objectives is also achieved. Therefore, in the descriptions below, typically only those habitat indicators which were determined to "degrade" or "restore" at the sixth field HUC are discussed. Whether discussed

below or not, information on all of the habitat indicators and ACS objectives were provided in the USFS' and BLM's BAs, and were considered in our analysis.
Three Rivers and Little Nestucca watersheds: Baxter Thin is proposed for the Three Rivers and Little Nestucca watersheds, which are non-key watersheds under the NFP. The thinning would affect 0.33% (81 acres) of the Three Rivers Watershed, and 0.9% (120 acres) of the Little Nestucca Watershed. For this action, the USFS determined that all of the habitat indicators would be maintained at the watershed scale over the long term, despite the project-level "degrades" which were recorded in the Buck/AIder and Louie/Baxter sixth field HUC Checklists. As noted under "Project-Level Effects," above, the "turbidity" indicator was thought to be degraded due to timber haul. This would occur if an unseasonable storm washes sediment from the road surface into stream channels. Even in that situation, it is unlikely to be detectable in any fish bearing stream in the watersheds. In the long-term and on the watershed scale, this "degrade" was thought to be inconsequential, because of its short-term and highway localized nature. Proper road maintenance, in fact, is likely to diminish the adverse effects of roads by allowing the drainage design features to work properly.

Based on the ACS Consistency Review for Baxter Thin, it appears that all of the relevant NFP S&Gs would be observed. Compliance with the nine ACS objectives is also adequately described by the USFS.

Deadwood Creek Watershed: Robinson LE is proposed for the Deadwood Creek Watershed, which is a non-key watershed under the NFP. For this action, the USFS found that at the project level, all of the habitat indicators would be maintained or restored as a result of the proposed action. The total acreage of this land exchange is 8.0 acres to be disposed of by the USFS, and 6.9 acres to be acquired. Because all habitat indicators are "maintained" at the project level, they would be maintained at the watershed level. Overall, the loss of management control of short reaches of two tributaries and some riparian meadow, and acquisition of some floodplain on the mainstem West Fork Deadwood Creek that would allow the USFS to engage in stream restoration, are inconsequential at the watershed scale because of the small area involved in this action. The action encompasses 14.9 acres, compared to 6,189 acres in the West Fork Deadwood Creek subwatershed and 43,262 acres in the Deadwood Creek watershed (USDA-FS 1996). Based on the ACS Consistency Review for Robinson LE, it appears that all of the relevant S&Gs would be observed. Compliance with the nine ACS objectives is also adequately described by the USFS.

North Fork Siuslaw River Watershed: Eichler Thin is proposed for the North Fork Siuslaw River Watershed, which is a key watershed under the NFP. F or this action, the USFS determined that all of the habitat indicators would be maintained at the watershed scale, despite the project-level "degrade" and several "restores" which were recorded in the project area Checklist. As noted under "Project-Level Effects," above, the "substrate/sediment" indicator was thought to be degraded due to timber harvesting, road construction and maintenance, and restoration activities associated with the proposed action. In the long-term and on the watershed scale, however, this "degrade" was thought to be inconsequential, because of the short-term effects of potential fine sediment production. Over the long term, aquatic and riparian dependent species would benefit from the restoration efforts associated with this project.

Based on the ACS Consistency Review for Eichler Thin, it appears that all of the relevant S&Gs would be observed. Compliance with the nine ACS objectives is also adequately described by the USFS.

Upper Alsea River Watershed: Bummer Swamp Regeneration Harvest is proposed for the Upper Alsea River Watershed, which is a non-key watershed under the NFP. For this action, the BLM determined that all of the habitat indicators would be maintained or restored at the watershed scale, despite the project-level "degrades" which were recorded in the Bummer Creek and Swamp Creek sixth field HUCs. As noted under "Project-Level Effects," above, the "road density and location" and "disturbance history" indicators were thought to be degraded as a result of the proposed action. Road density would increase by approximately 1 mile within the sixth field subwatersheds. However, within the Upper Alsea watershed, approximately 3.0 miles of road is scheduled for obliteration and decommissioning. Additional road improvements within the watershed include replacing eight culverts and restoring approximately three miles of road by reconditioning. Road obliteration, decommissioning, reconditioning, and culvert replacement should be even more beneficial actions at the watershed scale than the effect of the permanent road construction.

Also for the Bummer Creek and Swamp Creek subwatersheds Checklists, disturbance history was determined to be degraded, but on the watershed scale, it was expected to be maintained. This is because the amount of roads in the watershed would be slightly reduced, and because the amount of canopy cover removed during the sale (100 acres) is small when compared to the long-term baseline in the watershed. Thus, degradation of disturbance history in the sixth field should not impair recovery of the watershed.

Of the Federal lands (BLM and USFS) in the Upper Alsea watershed, a total of 32,445 acres (78%) are in the Late-Successional Reserve land use allocation. These lands will be managed so that in the long-term there will be a reduction in the amount of forest fragmentation in the watershed. According to USDI-BLM (1995), 4,525 acres of the 22,509 acres of BLM forested acres within the South Fork Alsea watershed are less than 30 years old. Within the next 10 years (long term), some acreage within this category will achieve full hydrologic recovery. During the same period, growth in additional acreage will achieve partial recovery. Therefore, even with canopy cover temporarily reduced to zero on 100 acres, the watershed as a whole would move closer to hydrologic recovery , due to passive restoration of canopy cover. In addition, according to USDI-BLM (1995),63% of BLM-owned land within the South Fork Alsea watershed will be protected as riparian reserves. Therefore, approximately two-thirds of the BLM-managed land in the watershed (the most important portion, from an anadromous fish viewpoint) will be protected from non-restorative activities, so that the relatively small amounts of regeneration harvest, etc. proposed for Matrix lands should not retard the recovery of the watershed as a whole.

Based on the ACS Consistency Review for Bummer Swamp Regeneration Harvest, it appears that all of the relevant S&Gs would be observed. Compliance with the nine ACS objectives is also adequately described by the BLM.

Upper Siuslaw River Watershed: Ward Creek Thin is proposed for the Upper Siuslaw River watershed, which is a non-key watershed under the NFP. For this action, the BLM determined

that all of the habitat indicators would be maintained at the watershed scale over the long term, despite the project-level "degrades" which were recorded in the Gowdy Creek subwat~rshed Checklist. As noted under "Project-level effects," above, the "sediment/turbidity" and "substrate" indicators were thought to be degraded due to road (including stream culvert replacements) and harvest related activities (hauling/increased truck traffic). In the long-term and on the watershed scale, however, these "degrades" were thought to be inconsequential, because of their short-term and highly localized nature. Road improvements designed to reduce the risk of sediment inputs would also occur, but likewise, is not expected to be of a level that would measurably improve current conditions at the watershed scale.

In addition, large woody debris was determined to be degraded in the short term in the Gowdy Creek subwatershed as a result of the proposed action. At the watershed scale, this indicator would be maintained. As noted under "Project-level effects," above, the size class of trees to be thinned is not technically large woody debris, although that size class of woody debris can serve a short term function of providing cover, pool habitat, and capture sediment and gravel. However, as a result of the thinning, over the long term, silvicultural treatment is expected to accelerate late-successional characteristics, and large diameter trees are expected to develop at a faster rate than if left unthinned. Overall, treated stands should begin to approximate pre-disturbance conditions at the local level. This may potentially lead to improved large wood delivery to fish-bearing reaches in a shorter time frame. These improvements are not expected to be of a magnitude that would substantially alter current conditions at the watershed scale, and therefore, the indicator is maintained.

Also for the Gowdy Creek subwatershed Checklist, the "disturbance history" indicator was determined to be degraded as a result of the proposed action. The proposed action involves thinning, rather than regeneration harvest, so while trees would be harvested, effect on hydrologic processes, for example, would be less. On the whole, through natural recovery of managed forest stands on Federally administered land, the percent of Federal land greater than 30-years old in the watershed is expected to increase in the next 10 years.

Finally, the BLM determined that Riparian Reserves would be degraded in the Gowdy Creek subwatershed, but would be maintained at the watershed scale. Riparian Reserves were designated as two site potential tree heights slope distance (400 feet) for fish-bearing streams. S&G TM-I [pages C-31-32 in USDA-FS and USDI-BLM (1994)] prohibits timber harvest within riparian reserves, except under three situations, specifically, TM-I c states, " Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives." Commercial thinning within the Riparian Reserves was applied to accelerate tree growth and encourage the accelerated recruitment of large woody debris (Siuslaw W A, page V -I). This is considered a restorative action, so thinning within the Riparian Reserve was considered to be consistent with TM-Ic. A 20- to 50-foot no-cut buffer along streams would be maintained within Riparian Reserves to be thinned to prevent adverse effects on temperature, bank stability, etc. From the BLM's review, it appears that TM-I and all of the other relevant S&Gs would be observed. Compliance with the nine ACS objectives is also adequately described.

Effects Summary. The NMFS has considered the applicability of these analyses to each of the proposed actions identified in the BAs and in this Opinion. The NMFS is not aware of any other special characteristics of the particular actions that would cause greater or materially different effects on Oregon Coast coho salmon and their habitat than is discussed in these references. Similarly, the NMFS is not aware of any newly available information that would materially change these previous effects analyses. In that substantial portions of all of the watersheds discussed in this Opinion are privately-owned, the NMFS assumes that the cumulative effects of non-Federal land management practices will continue at similar intensities as in recent years [pages 41-42 in NMFS (1997a)].

The effects of the proposed actions on Oregon Coast coho salmon and their habitat are presented in the BAs prepared by the USFS and BLM (specifically in the project and watershed-level Checklists, ACS Consistency Reviews, watershed analyses and the environmental assessments). The NMFS finds those descriptions to be adequate for this analysis. Based on this information, the NMFS does not believe these actions will likely result in more effects than expected or considered in NMFS (1997a). In particular, the USFS and BLM determined, and the NMFS concurred, that relevant NFP S&Gs would be followed, and that ACS objectives would be met at the watershed scale and in the long term when the effects of the proposed actions are combined with the environmental baseline. This ACS consistency determination was made because the . USFS and BLM showed that, despite their proposed actions, watershed habitat indicators would be maintained over the long-term.

The NMFS expects that ACS objectives which may be affected by the subject actions will be met for the following reasons: 1) potential sediment input from the small amount of proposed temporary, semi-permanent, and permanent road construction will be minimized by construction on ridge tops or stable locations, no stream crossings, and implementation of Best Management Practices (BMPs); 2) potential sediment input from proposed road maintenance, improvement, renovation, storm-proofing, decommissioning, and obliteration will also be minimized by implementation of appropriate BMPs, and the long-term effects of these actions should be beneficial because of lessened sediment and hydrologic effects from existing roads; 3) thinning within Riparian Reserves will allow the remaining trees to attain old-grow characteristics, including height and mass, more quickly than otherwise; in the long-term, this should facilitate the production of superior sources of large woody debris for streams in the sale areas, otherwise, no timber harvest will occur in Riparian Reserves; 4) ground compacting activity (partial suspension and tractor yarding) will be mitigated through ripping and water-barring of skid trails, and none of the yarding activity (except for that associated with riparian thinning[3]) will occur in Riparian Reserves; and 5) the amount of canopy cover removed in the timber sales would be small compared to the passive restoration which will occur in the watersheds over the long-term, and should not impair recovery of the watersheds. Despite the minor, short-term adverse effects, these actions maintain or restore essential habitat functions, and will not impede recovery of salmonid habitat, a long-term goal of the NFP .

[3] Of the 521 acres of timber harvest proposed in the timber sales, 174 acres of thinning and I acre of hardwood conversion will be conducted in Riparian Reserves.

Section 7(a)(2) Determinations

The NMFS concludes that, when the effects of these proposed site specific actions are added to the environmental baseline and cumulative effects occurring in the relevant action areas, they are not likely to jeopardize the continued existence of Oregon Coast coho salmon.
In reaching these conclusions, NMFS has utilized the best scientific and commercial data available as documented herein and by the BAs and documents incorporated by reference.

Incidental Take Statement

Effects resulting from road construction, road maintenance, road renovation, hauling, and road and skid trail decommissioning (e.g., sedimentation) are expected to be the primary source of incidental take associated with the proposed actions covered by this Opinion. Because of the . limited amount of new road construction and location of the road, and the implementation of appropriate mitigation measures for the other road-related activities, sediment impacts are expected to be minimized. Effects of harvesting in Riparian Reserves are also expected to be minimal because no-cut buffers (of varying width, based on site characteristics) should reduce or eliminate stream sedimentation, and would maintain shade and bank stability , and most trees (including the largest) would be retained, which would provide short-term large woody debris, and accelerate development of superior large woody debris in the future. The NMFS expects that the incidental take associated with the other effects (discussed in NMFS 1997b) of the subject timber sales will also be minimal.

Adverse effects of management actions such as these are largely unquantifiable in the short-term, and may not be measurable as long-term effects on the species' habitat or population levels. Therefore, even though the NMFS expects some low level of incidental take to occur due to these actions, the best scientific and commercial data available are not sufficient to enable the NMFS to estimate a specific amount of incidental take to the species themselves.
The incidental take statement in NMFS (1997a) provided reasonable and prudent measures and terms and conditions to avoid or minimize the take of listed salmonids from actions involving road construction (pages 65 and 70- 72) that may be applied to site specific actions if appropriate. The NMFS hereby applies the findings, reasonable and prudent measures, and terms and conditions set forth in the Incidental Take Statement of NMFS (1997a) to the site specific road construction action.

To the minimal extent that incidental take may result from the non-road construction aspects of the proposed actions, the NMFS finds that it is appropriate to prescribe reasonable and prudent measures, with terms and conditions, to further minimize or avoid such incidental take. Based on the effects analysis presented in NMFS (1997a), the NMFS finds that the reasonable and prudent measures, with terms and conditions proposed in that document are appropriate for these Actions. Therefore, the NMFS further authorizes such minimal incidental take, provided the Siuslaw NF, Salem District BLM, and Roseburg District BLM complies with those reasonable and prudent measures, and terms and conditions.

Conclusions

This concludes formal consultation on these actions in accordance with 50 CFR. 402.l4(b)(I). The Siuslaw NF or Salem District BLM must reinitiate this ESA consultation: (1) If the amount or extent of taking specified in the incidental take statement is exceeded;(2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions, please contact Garwin Yip of my staff at (503) 230-5419.

Sincerely,

William Stelle, Jr.
Regional Administrator

References

National Marine Fisheries Service (NMFS):1996. Making Endangered Species Act determinations of effect for individual or grouped actions at the watershed scale. NMFS, Northwest Region, Seattle, Washington. August 1996. 14 pages plus 4 appendices.

National Marine Fisheries Service (NMFS). 1997a. Biological Opinion and Conference Opinion on Implementation of Land and Resource Management Plans (USFS) and Resource Management Plans (RMP) on the Oregon coast. NMFS, Northwest Region, Seattle, Washington. March 18. 75 pages plus 3 attachments: Attachment I: Biological requirements and status under 1996 environmental baseline: Umpqua River cutthroat trout, Oregon Coast coho salmon, Oregon Coast steelhead, Southern Oregon/Northern California coho salmon, Klamath Mountain Province steelhead, Lower Columbia steelhead, and chum salmon. September, 1997; Attachment 2: Application of Endangered Species Act standards to: Umpqua River cutthroat trout, Oregon Coast coho salmon, Southern Oregon/Northern California coho salmon, Oregon Coast steelhead, Klamath Mountain Province steelhead, Lower Columbia steelhead, chum salmon, chinook salmon, and sea-run cutthroat trout. February , 1997.

National Marine Fisheries Service (NMFS). 1997b. The potential effects of timber harvest and associated activities on salmonid habitat and measures to minimize those effects. NMFS, Northwest Region, Seattle, Washington. July.

United States Department of Agriculture -Forest Service (USDA-FS). 1994. North Fork of the Siuslaw River Watershed Analysis. Siuslaw National Forest. December. 100 pages plus 21 appendices.

United States Department of Agriculture -Forest Service (USDA-FS). 1996. Indian/Deadwood Watershed Analysis. Siuslaw National Forest. June. 106 pages plus 14 appendices.

United States Department of Agriculture -Forest Service (USDA-FS). 1998. Little Nestucca Watershed Analysis. Siuslaw National Forest, Hebo Ranger District. June. 74 pages plus 5 appendices.

United States Department of Agriculture -Forest Service and United States Department of the Interior- Bureau of Land Management (USDA-FS and USDI-BLM). 1994. record of Decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl; standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Washington, D.C. Apri113.

United States Department of Agriculture -Forest Service (USDA-FS), Unite-d States Department of the Interior -Bureau of Land Management, Environmental Protection Agency,

National Marine Fisheries Service, Soil Conservation Service, and U.S. Fish and Wildlife Service. 1994. Nestucca Watershed Analysis. October. 74 pages plus 6 appendices.

United States Department of Interior -Bureau of Land Management (USDI- BLM). 1995. South Fork Alsea Watershed Analysis. Salem District, Marys Peak Resource Area. October. 110 pages plus 18 appendices.

United States Department of Agriculture -Forest Service (USDA-FS), Unite-d States Department of the Interior -Bureau of Land Management, Environmental Protection Agency, National Marine Fisheries Service, Soil Conservation Service, and U.S. Fish and Wildlife Service. 1994, Nestucca Watershed Analysis. October. 74 pages plus 6 appendices.

United States Department of Interior -Bureau of Land Management (USDI- BLM). 1995. South Fork Alsea Watershed Analysis. Salem District, Marys Peak Resource Area. October. 110 pages plus 18 appendices.

United States Department of Interior -Bureau of Land Management (USDI -BLM). 1996. Siuslaw Watershed Analysis. Eugene District. February. 6 chapters plus 5 Appendices.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-24, 258 p.